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10/722,558	11/28/2003	Stefanie R. Chiras	YOR920030367US1 (20140/03)	4980
30678	7590	10/31/2007	EXAMINER	
CONNOLLY BOVE LODGE & HUTZ LLP			BOOTH, RICHARD A	
1875 EYE STREET, N.W.			ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
10722558 (20140/03)	11/28/03	CHIRAS ET AL.	YOR920030367US1

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EXAMINER

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ART UNIT

PAPER

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Commissioner for Patents

see attached examiner's answer

Richard A. Booth
Primary Examiner
Art Unit: 2812



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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/722,558
Filing Date: November 28, 2003
Appellant(s): CHIRAS ET AL.

MAILED
OCT 31 2007
GROUP 2800

Burton A. Amernick
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 07/13/07 appealing from the Office action mailed 05/05/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,486,059	LEE ET AL.	11-2002
5,897,368	COLE JR. ET AL.	04-1999
6,140,234	UZOH ET AL.	10-2000
6,221,757	SCHMIDBAUER ET AL.	04-2001
1 233 448	LU ET AL.	08-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 3-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al., EP 1 233 448 in view of Lee et al., U.S. Patent 6,486,059.

Lu et al. shows the invention as claimed including a process for forming an electrically conductive metallic interconnect in a via in a dielectric which comprises:

providing a dielectric layer (102,104) in a substrate wherein the substrate comprises electrically conductive copper lines 101, forming a trench or via 106,108 in the dielectric layer and exposing electrically conductive line in the substrate; depositing a first liner layer 124 comprising, for example, tantalum on the walls and bottom of the trench or via; removing residual contamination from the bottom of the trench or via using argon etching (see fig. 3C); depositing a second liner layer 126 of tantalum on the walls and the bottom of the trench or via; depositing a copper seed layer (see paragraph 0021) in the trench or via and filling the trench or via with electrically conductive material 118 such as copper (see figs. 3A-3F and paragraphs 0010-0022).

Lu et al. is applied as above but does not expressly disclose a low-K dielectric material having a dielectric constant of less than 3.9.

Lee et al. discloses forming an interlayer dielectric of a material such as SiLK which has a dielectric constant in the claimed range (see col. 2-lines 20-36). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lu et al. so as to form an interlayer dielectric of the claimed low K dielectric material because such an interlayer dielectric is a suitable material to be used in metallization processes, and low K dielectric materials are known to reduce capacitive coupling and crosstalk between metallization layers.

Claims 15 and 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al., EP 1 233 448 in view of Lee et al., U.S. Patent 6,486,059 as

applied to claims 1 and 3-14 above, and further in view of Cole, Jr. et al., U.S. Patent 5,897,368.

Lu et al. and Lee et al. are applied as above but do not expressly disclose depositing an adhesion layer prior to depositing the first liner layer, and wherein residual contamination and the adhesion layer are removed from the bottom of the trench prior to depositing the first liner layer.

Cole, Jr. et al. discloses forming an adhesion layer 22 in a via and removing the adhesion layer from the bottom of the trench prior to depositing additional metallization layers (see figs. 2-4 and col. 3-line 49 to col. 4-line 31). In view of these disclosures, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Lu et al. so as to form an adhesion layer on the inner vertical surfaces of the via because this will allow for optimum adhesion of subsequently deposited layers. With respect to residual contamination being removed from the bottom of the trench prior to depositing the first liner layer, the selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results (see *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946)).

Claims 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al., EP 1 233 448 in view of Lee et al., U.S. Patent 6,486,059 as applied to claims 1 and 3-14 above, and further in view of Uzoh et al., U.S. Patent 6,140,234 or Schmidbauer et al., U.S. Patent 6,221,757.

Lu et al. and Lee et al. are applied as above but do not expressly disclose the tantalum being alpha tantalum. Uzoh et al. discloses the use of alpha tantalum as a metallization layer (see col. 3-lines 46-55), and Schmidbauer et al. also discloses the use of alpha tantalum as a metallization layer (see col. 4-lines 40-50). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lu et al. modified by Lee et al. so as to have the tantalum be alpha tantalum because alpha tantalum has been identified as an important prerequisite for subsequent copper deposition.

(10) Response to Argument

Appellant's arguments filed 07/13/07 have been fully considered but are not deemed persuasive.

In response to applicant's argument that the motivation to combine the low K dielectric material from the Lee et al. reference to the primary reference of Lu et al. is for a different reason than that of applicant, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Moreover, in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references

themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to combine the Lee et al. reference with the primary reference of Lu et al. is that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Lu et al. so as to form an interlayer dielectric of the claimed low K dielectric material because such an interlayer dielectric is a suitable material to be used in metallization processes, and low K dielectric materials are known to reduce capacitive coupling and crosstalk between metallization layers. Furthermore, the independent claim requires that the dielectric constant be less than 3.9 and even a material such as silicon dioxide which is discussed in the primary reference has a dielectric constant of 3.9, which is extremely close to the claimed range.

Regarding appellant's contention that there is not a reasonable expectation of success to combine the Lee et al. and Lu et al. references, the examiner submits that both references are directed to metallization processes in which interlayer dielectrics are used and therefore there is certainly at least a reasonable expectation of success to combine the references especially in a predictable art such as semiconductor processing.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was

within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Appellant argues that an "obvious to try" standard has been used in the above rejections. However, the examiner respectfully submits, as stated above, that ample motivation is present to combine the references, and an obvious to try standard has not been applied by the examiner. Moreover, recent court decisions appear to cast doubt on whether the "obvious to try" standard is improper.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the complete process exemplified by fig. 10 of the instant application) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Concerning the rejection under 35 USC 103 of claims 15 and 17-22 over Lu et al. in view of Lee et al. and Cole, Jr. et al., appellant argues that there is no motivation to combine Cole, Jr. et al. with the other mentioned references and Cole, Jr. et al. does not disclose an adhesion layer. However, the examiner respectfully disagrees since Cole, Jr. et al. discloses that having two layers provides optimum adhesion (see col. 4-lines 33-35), and this provides ample motivation for adding a second adhesion layer to the primary reference of Lu et al..

Regarding the rejection of claims 31-32 under 35 USC 103 over Lu et al. in view of Lee et al. and Uzoh et al. or Schmidbauer et al., for the reasons disclosed above with respect to claim 1 it is believed this rejection is also proper.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



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Senior Examiner
Art Unit 2812

Conferees:



Mike Lebentritt, SPE, Art Unit 2812



Dave Blum, TQAS, Appeals Specialist